

Effect of a Smoking Cessation Program on Inpatients in the Largest Hospital in Southern Iran

Abstract

Background: There is evidence that cessation programs can be effective for hospital inpatients. Hence, the aim of this study was to investigate the effects of such programs and factors that may affect success. **Methods:** This study was carried out on in-patient users of tobacco in Shiraz Hospital, Iran in 2015. After implementing the inclusion criteria, a study population was selected using a convenience sampling method. Participants were contacted monthly by study personnel concerning certain aspects of their tobacco cessation program. The study lasted 6 months. Data analyses involved survival analysis using Kaplan–Meier analysis, log-rank test, and multivariate Cox regression modeling. **Results:** The study included 425 in-patient smokers of which 328 (77.2%) were male. Median follow-up time was 96 days (interquartile range: 20–150). Cessation survival rates were 76% at 1 month, 63% at 2 months, and 61% at 3 months. From the 4th month onward rates remained unchanged at 60%. Univariate analyses with variables such as time since last smoking, consumption type, interval between wake-up and consumption, the severity of dependence and interest in smoking cessation were statistically significant as to cessation survival rate ($P < 0.05$). After adjusting the confounding variables based on multivariable analyses, results indicated that consumption type, the severity of dependence and interest in smoking cessation were the most important predictors of cessation survival rates among in-patient smokers. **Conclusions:** Findings indicated that application of the cessation program among our group of inpatients appears to have been an effective intervention that produced an extended period of no smoking.

Keywords: *Inpatients, smoking cessation, tobacco use*

Introduction

Today, more than one billion people smoke tobacco making it a prime risk factor for the onset of chronic diseases including cancer, respiratory, and cardiovascular maladies. Tobacco smoking is responsible for approximately seven million deaths annually.^[1]

Fatalities and other consequences of tobacco smoking are predicted to increase steadily over the next 30 years.^[1-3] Tobacco smoking causes 16,000 deaths each year in England.^[4] It is predicted that the prevalence of tobacco-related fatalities will continue to increase over the next 30 years, resulting in significantly higher medical costs and heavy economic losses in terms of decreased earnings and shorter life spans.^[1,5] Smoking intervention is a proven effective mechanism that through limiting tobacco use decreases incidences of disease and improves the overall quality of life.^[5]

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There are approximately 10,000,000 smokers in Iran, which results in 60,000 deaths (25% of all deaths) annually.^[6] The benefits of tobacco cessation have been demonstrated repeatedly with the best results coming from those under the age of 35.^[7] However, cessation even at the age of 70 also will result in preventing premature death.^[7]

Because of smoking results in higher rates of hospitalization, Iranian medical facilities have since 1992 actively become involved with cessation programs. This includes establishing tobacco-free environments and formal cessation programs. It is known that such efforts can be successful, especially if the cause of hospitalization is tobacco-related.^[2,5,8] In a 2001 study, 6-month cessation success was far greater among hospitalized patients who started to quit while being an inpatient (45% success rate) versus that of outpatients (25%).^[9] Studies have reported the positive effect of decreasing tobacco use from financial and medical standpoints while the smoker

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Fatemeh Tabatabai Shoorijeh, Charles John Palenik¹, Mehrdad Askarian²

Student Research Committee, Department of Community Medicine, Shiraz University of Medical Sciences, Shiraz, Iran, ¹Indiana University School of Dentistry, Indianapolis, IN, USA, ²Department of Community Medicine, Medicinal and Natural Products Chemistry Research Center Shiraz University of Medical Sciences, Shiraz, Iran

Address for correspondence:
Prof. Mehrdad Askarian,
Department of Community
Medicine, School of Medicine,
Shiraz University of Medical
Sciences, Karimkhan-e-Zand
Avenue, P. O. Box: 71345-1737,
Shiraz, IR Iran.
E-mail: askariam@sums.ac.ir

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was hospitalized.^[2,5,8] Study data have resulted in the formation of cessation guidelines and protocols^[2,5] which indicate the need for an initial hospital consultation and pharmacotherapy that must continue after release.^[5,8]

Because of the importance and potential effectiveness of tobacco cessation programs in a hospital environment along with the emphasis of world health organization on the dangers associated with tobacco use, it was decided to implement such a program for the first time in Shiraz Nemazee Hospital. This facility is the largest medical center in Southern Iran. This study was carried out to investigate the effect of a tobacco cessation program and factors that could affect success.

Methods

Study population

This research project reviewed inpatient tobacco smoking inpatients in Shiraz, Fars Province, Iran Approval for the study came from the Vice President of Research and Technology and the Ethics Committee (ec-p-9375-7155) of Shiraz University of Medical Sciences. During 2015, researchers visited all inpatients (2156 total) in several wards (including general and cardiac surgery, coronary care, internal medicine, neurology, and urology) to evaluate them in terms of having inclusion conditions (dependency on tobacco compounds such as cigarette, hubble-bubble, pipes, or chewing tobacco and ascertaining if the patient as willing to participate in a tobacco cessation program). In the end, 425 patients were recruited using a convenience sampling method after obtaining their informed consent.

Study process implementation

After inclusion, researchers reviewed initial patient data collection forms, which included demographic information, cause (s) for hospitalization, ward, contact phone number, companions, disease history among first-degree relatives, and the time elapsed since last smoking and dates of hospitalization. Another form was completed which included types of tobacco materials used, average daily consumption, interval between waking up in the morning and beginning tobacco consumption, the age when beginning to smoke, having a family member or close friend who also smokes, having received advice on cessation and an evaluation of the tendency to quit smoking. Finally, a date for a follow-up phone call or an in-person visit approximately 3 weeks after discharge was determined.

Because none of the participants desired an in-person visit, study researchers were forced to conduct the established protocol (except for medications) by phone (six monthly calls). During the initial contact, researchers informed participants of the study's goals. Implementation plans (methodology) was discussed during subsequent consultations. Patient national ID codes were applied to the study forms using software designed in-house. This meant

that the completed forms could be opened and the patient information reviewed and edited, if necessary.

There were two conditions:

If the last tobacco smoking took place before hospitalization

Because smoking is forbidden in hospitalization wards, many of the patients began their cessation process while hospitalized. This means that forms and checklists were completed soon after admission as possible.

Data collected included the types and amount of the tobacco materials used, the average daily consumption, age when regular smoking began, the duration of nonsmoking, methods for and frequency of motivating schemes to help patients continue their cessation process, evaluation of a patient's desire to quit, including the most important reason for recent efforts to quit smoking, current methods of cessation used, including types and amounts of nicotine applications and patient satisfaction with the study. Data were incorporated into a formal checklist. In the next step, the patient readiness (e.g., prethinking, thinking, readying, or maintenance) was assessed. Patients received recommendations and strategies when judged ready for cessation. Researchers tried to present appropriate behavior modification techniques to address postcessation temptations.

If the last tobacco smoking took place <30 days ago (present/current smoker)

Data on the checklist used on present/current smokers included information such as type and amount of used tobacco materials, the average daily tobacco consumption, the age when beginning to smoke, evaluation of the desire to quit, previous cessation history, previous cessation methods, including types and dosage of the drugs employed, the interval since last cessation attempt and if cessation resulted in a minimum 24-h cessation in the past year. The checklist also reported on patient readiness for cessation within the next 30 days, their most important reason for trying to quit, perceived harmful signs of cessation and reason (s) and date for the last cessation's failure.

Based on checklist data patients were classified into two categories-interested and uninterested. In the interested group, the patients were asked to score their desire to quit smoking from 1 (lowest) to 5 (highest). Those with scores of at or near 5 were considered in the "ready to quit group" and were further evaluated as to their patient readiness. Those with scores of around 1 were categorized as to be in the "unready to quit group." For these people, a cessation program was implemented that involved patient readiness steps, presentation of a motivational report and application of the 5R technique (relevance, risks, rewards, roadblocks, and repetition).

For those in the uninterested and hesitant groups (2-4), additional phone calls were made that included motivational interviews performed by the study researchers.

Description of protocol

Because none of the participants desired an in-person visit, study researchers were forced to conduct the established protocol by phone. After informing goals of the study, implementation plans was described during next consultations. In patients with the last tobacco smoking before hospitalization, basic needed data collected and in the next step, the patient readiness (e.g., prethinking, thinking, readying, or maintenance) was assessed. Patients received recommendations and strategies when judged ready for cessation. Researchers tried to present appropriate behavior modification techniques to address postcessation temptations. In patients with the last tobacco smoking took place <30 days ago, after collecting data as mentioned earlier, using checklist data, patients were classified into two categories – interested and uninterested. In the interested group, the patients who were “ready to quit group” and were further evaluated as to their patient readiness. Another group were labeled as “unready to quit group.” For these people, a cessation program was implemented that involved patient readiness steps, presentation of a motivational report and application of the 5R technique (relevance, risks, rewards, roadblocks, and repetition).

For those in the uninterested and hesitant groups, additional phone calls were made that included motivational interviews performed by the study researchers.

Analysis

All statistical analyses were conducted using the SPSS software package for Windows, Version 22 (SPSS Inc., Chicago, USA) and STATA version 11 (STATA Corporation, College Station, TX, USA). Continuous variables were presented as mean \pm standard deviations or median and interquartile range (IQR). Qualitative variables are presented as numbers and percentages.

The Kaplan–Meier method was used to calculate observed survival, while log-rank statistics was used to compare the differences in survival curves. Furthermore, multivariate Cox proportional hazards regression analysis was performed to determine the influence of the programs and factors affecting cessation survival rate. Variables of $P < 0.2$ provided a basis for the proportional hazard assumptions and were entered into the Cox regression model using a forward likelihood ratio method. All probability tests were two-tailed with a $P < 0.05$ was considered statistically significant.

In this study, recitative smoking was considered as a countable event and inpatients that died or remained nonsmokers until the end of study were considered as censor. Variable time to event was assessed based on the moment that inpatients entered to study until the moment they started (or did not start) smoking again.

Results

Table 1 shows that 425 tobacco smoking inpatients, 328 men (77.2%) and 97 women (22.8%) participated. The

Table 1: The demographic information of inpatient smokers in Nemazee Hospital, 2015

Variable	n (%)
Ethnicity	
Fars	332 (78.1)
Lurs	25 (5.9)
Turks	54 (12.7)
Other	14 (3.3)
Occupation	
Self-employed	209 (49.2)
Government job	25 (5.9)
Retired	34 (8.0)
Unemployed	63 (14.8)
Household	94 (22.1)
The history of previous hospitalization	
Yes	292 (68.7)
No	133 (31.3)
Hospitalization ward	
Surgery	138 (32.5)
CCU	66 (15.5)
Internal medicine	221 (52.0)
The history of the disease in family	
Yes	216 (50.8)
No	209 (49.2)
The relation of the patient in the family	
Father	67 (31.0)
Mother	80 (37.0)
Sister	15 (6.9)
Brother	26 (12.0)
More than one person	28 (13.0)
The disease type in the family	
>1	28 (13.0)
Cardiovascular	58 (26.9)
Cancer	3 (1.4)
DM	48 (22.2)
Other	19 (8.8)
HTN	36 (16.7)
GL	1 (0.51)
Kidney	16 (7.4)
Liver	6 (2.8)
Nervous	1 (0.5)
The interval between waking up and consumption	
Other	160 (37.6)
1 h	94 (22.1)
30 min	117 (27.5)
5 min	54 (12.7)
Solution	
Advising to quit	69 (23.0)
Persuading	39 (13.0)
Controlling the traffic	140 (46.7)
Other	31 (10.3)
More than one item	21 (7.0)
A friend who smokes	
Yes	224 (93.3)
No	16 (6.7)

Contd...

Table 1: Contd...	
Variable	n (%)
Being interested in cessation	
Does not have and does not know	45 (11.3)
He/she has	352 (88.7)
Being aware of consumption hazards	
Yes	377 (88.9)
No	47 (11.1)
Patients status	
Alive	386 (90.8)
Death	39 (9.2)
Education	
Illiterate	122 (28.7)
Elementary	202 (47.5)
High school	84 (19.8)
Diploma and higher	17 (4.0)
Accommodation	
Shiraz	157 (36.9)
Other	268 (63.1)
The reason of current hospitalization	
Cardiovascular	83 (19.5)
Lung	22 (5.2)
GI	69 (16.2)
Cancer	23 (5.4)
Other	228 (53.6)
Disease history	
Yes	308 (72.5)
No	117 (27.5)
Type of the disease	
DM	14 (4.5)
Heart	25 (8.1)
Liver	9 (2.9)
HTN	9 (2.9)
Kidney	21 (6.8)
Other	3 (1.0)
More than one type	202 (65.5)
Neurology	16 (5.2)
GI	7 (2.3)
Hematology	2 (0.6)
The distance of the last smoking use	
>30 days	62 (14.6)
<30 days	363 (85.4)
Type of consumption	
Cigarette	277 (65.2)
Hubble-bubble	129 (30.4)
More than one item	19 (4.5)
The average daily cigarette smoking	
1-10 ones	95 (32.1)
11-20 ones	135 (45.6)
21-30 ones	30 (10.1)
>30 ones	36 (12.2)
The average daily consumption of hubble-bubble	
5 min	21 (14.2)
10 min	29 (19.6)
15 min	7 (4.7)

Contd...

Table 1: Contd...	
Variable	n (%)
20 min and longer	91 (61.5)
Severity of dependence	
Mild	314 (73.9)
Sever	111 (26.1)
A family member who smokes	
Yes	300 (70.6)
No	125 (29.4)
Supporter in the family	
Yes	384 (90.4)
No	41 (9.6)
How many times a friend who smokes is visited	
>3 days	195 (87.1)
<3 days	29 (12.9)
The history of previous cessation	
Yes	157 (50.6)
No	153 (49.4)
Consumption status in the last consumption	
Yes	160 (37.6)
No	265 (62.4)

Data expressed as n (%). CCU=Coronary Care Unit, DM=Diabetes mellitus, HTN=Hypertension, GI=Gastrointestinal

median duration of follow-up was 96 (IQR = 20–150) days with a range of 1–230 days. The mean age of inpatients, their range of age and their median age were 52.7 ± 16.3 , 18–94, and 52 years, respectively. Furthermore, the mean age of when smoking began was 26.4 ± 11.4 years, whereas the lowest and highest starting age were 9 and 82 years. 85.4% of patients had smoked during the last 30 days. Nearly 65.2% of participants smoked cigarettes, whereas 30.4% of smoke hubble-bubble (water pipe). The most widely used method for controlling smoking was complaints from smoker families who observed activity in and away from home. Nearly 90.4% were supported by their family to quit, whereas 88.7% were aware of the dangers associated with tobacco smoking. Demographic information of study participants can be found in Table 1.

Cessation survival rates were 91% after the 1st week, 84% at 2 weeks, 76% at 1 month, 63% at 2 months, 61% after the 3rd month and approximately 60% from the 4th month to the end of the study [Figure 1]. Comparison of cessation survival within the subgroup variables was studied using univariate conditions, including log-rank tests. Results indicated statistically significant relationships ($P < 0.05$) existed between cessation survival and select variables including the period since the last tobacco use, consumption type, the interval between wake-up and consumption, the severity of dependence and interest to smoking cessation.

Six-months cessation survival rates for inpatients who had not smoked for at least 30 days before entering the cessation program were greater than those of inpatients whose last smoking event was <30 days previously ($P = 0.05$). Furthermore, the cessation survival

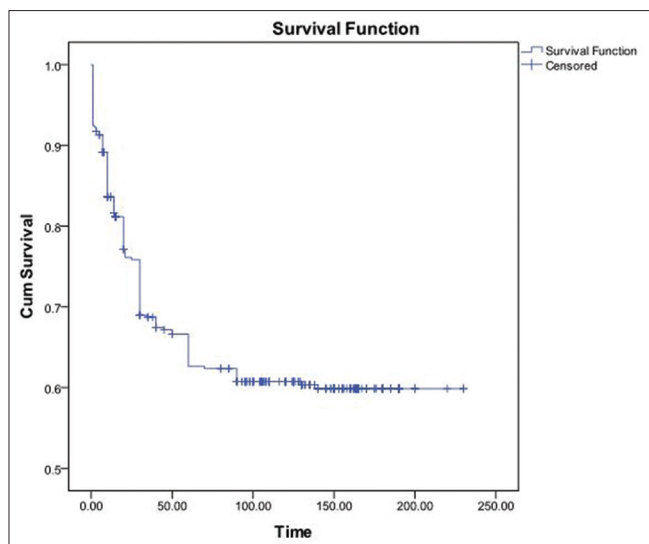


Figure 1: The curve of the cessation function for the tobacco-smoking inpatients using the Kaplan–Meier method inpatient smokers in Nemazee Hospital, 2015

rate for inpatients by consumption type indicated that more than one item smokers were higher than those using only cigarettes or hubble-bubble ($P = 0.001$). Moreover, patients with mild dependence had a greater cessation survival rate than those with severe dependencies ($P = 0.002$), whereas patients with a greater interest in stopping were more likely to quit ($P = 0.037$).

This study used a multivariate Cox regression model to investigate factors affecting on the cessation survival rate among tobacco-smoking inpatients after modifying for confounding factors. Variables with $P < 0.2$ values or better provided the foundations for proportional hazard assumption (PHreg plots) and entered into the Cox regression model using a forward likelihood ratio method.

The results of multivariate Cox analyses indicated that variables such as consumption type, the severity of dependence and interest in stopping smoking were the most important predictors of cessation survival rate for inpatient smokers. Patients who had no interest in stopping were 1.59 (confidence interval [CI]; 95%; 1.03–2.24) times more likely to use smoke again when compared with those interested a cessation program.

Furthermore, patients severely dependent on smoking were 1.81 (CI 95%; 1.29–2.53) times more likely to use again as compared to mildly dependent patients. Cigarette or hubble-bubble smokers had 4.61 (CI 95%; 1.44–14.71) and 2.36 (CI 95%; 0.67–7.38) times more likely to use again than more one item smokers, respectively [Table 2].

Discussion

Study results indicated that 60% of participants had quit by the end of their cessation course. In a study performed in the city of Yazd reported that a smoking clinic intervention

Table 2: The modeling of the factors affecting cessation in the tobacco-smoking inpatients by using Cox regression model inpatient smokers in Nemazee Hospital, 2015

Variable	β	SE	HR	CI	P
Type of consumption					
More than one type (reference)	-	-	-	-	-
Cigarette	1.52	0.59	4.61	1.44-14.71	0.010
Hubble-bubble	0.80	0.61	2.23	0.67-7.38	0.187
Interest to cessation					
Interested (reference)	-	-	-	-	-
No interested	0.46	0.22	1.59	1.03-2.46	0.037
Dependence level					
Mild (reference)	-	-	-	-	-
Sever	0.59	0.17	1.81	1.29-2.53	0<0001

*Nonsignificant predictors: Education level, Hospitalization ward, distance of the last smoking use, interval between waking up and consumption. Data are analyzed by multivariate Cox proportional hazards regression. HR=Hazard ratio, CI=Confidence interval, β =Beta-coefficient, SE=Standard error

scheme produced only a 16.6% success rate.^[10] A study conducted by Hymowitz *et al.* revealed that 67% of participating cigarette smokers reported attempting a serious cessation effort; however, only 33% were successful by the end of the study.^[11]

King *et al.* investigated tobacco cessation interventions among African–Americans. The desire to smoke and associated signs of depression had decreased during the 1st month of most programs. Cessation levels after the 1st, 2nd, 3rd and 4th weeks were 32%, 56%, 44%, and 34%, respectively and 22% after the 3rd through 6th months.^[12] Another study, which was similar to that of King *et al.* in that is used the same population but different pharmacotherapy techniques plus a motivational interview, cessation values were 36% in the end of 7 weeks and 22% after 6 months.^[12] The highest cessation level in the study's population was 49% at 6 weeks using a multi-step intervention method which included strong behavioral consultations, nicotine patches, social support, and mental health consultations employing the assistance of a variety of health observers.

Another study used alternative methods for nicotine provision, and behavioral consultations reported that patients who had participated completely in a tobacco cessation course were more 50% more successful in quitting than those who had not participated in all coursework. It also has been reported that stronger participant desire to quit, improved surveillance, and more complete interventions will increase cessation. As intervention levels increase, cessation levels will increase by 2–3 times. It should be noted, nonparticipation in training courses may not be considered the only cause of cessation failure because many successful quitters had not participated in all sessions and cessation consultation courses.^[10]

In this study, choosing inpatients as participants was likely one of the reasons for higher cessation levels at the 6-month point. Providing participants an opportunity to quit tobacco smoking while as inpatients proved advantageous. Munafò *et al.* reported that cessation might be easier in locations where cigarette smoking was limited or even prohibited. This study also indicated providing tobacco cessation services within a hospital environment helped those trying to quit and increased the chances of a longer cessation.^[13] Park *et al.* showed that the patients hospitalized for coronary artery disease were more motivated to quit smoking than those hospitalized for other reasons.^[14] Intervention among smokers with cardiovascular diseases proved motivated to quit after receiving a phone consultation.

Some of the inpatients that participated in this study were being treated for some type of cardiovascular disease (19.5%). Harms associated with smoking might have had a motivation effect to stop. In this study, 88.9% of participants were aware of the risks associated with tobacco smoking. In the survey done by Park *et al.*^[14] more than 50% of participants declared that their knowledge about the harms of smoking was one of the early reasons for stopping. It appears that additional factors may have to be present to better assure a cessation attempt. Attending physicians may have to pay more attention to patient needs and provide stronger support for cessation. A constant level of encouragement appears required for improving the chances of smoking cessation.^[14]

As in this study, Aminian *et al.* demonstrated significant differences exist between the successful and unsuccessful cessation groups in terms of having or not having smoking-related diseases.^[10] Aminian *et al.* also revealed that those who were successful in cessation often suffered from smoking-related diseases, such as cardiovascular and/or pulmonary diseases (40.5% vs. 23.5%) and that having smoking-related diseases, changing behavior advice, lower nicotine dependence, and produced fewer postcessation complications. A study conducted in Korea followed patients for 96 months after heart surgery and found that 72% had remained tobacco-free.^[14]

Studies conducted between 1996 and 2000 produced a set of clinical practice guidelines which emphasized the importance of physician-directed cessation interventions to help reduce tobacco consumption.^[5,6] The mentioned studies as well as the results of this study indicate that if consultations are made by health care personnel, especially physicians, the chances of cessation increased dramatically. However, McMenamin *et al.* reported that most users do not receive the tobacco cessation interventions from physicians in spite of the fact that almost 70% had visited their physician in the past year. It appears a possible chance for effective cessation intervention may have been lost.^[15]

In today's complicated health care environment, greater attention should be paid to the fact that successfully

treating dependence on tobacco best lies within the health care system.^[14] According to meta-analyses results, US Clinical Practice Guidelines indicated. Short-term (<3 min), long-term (3-10 min) and very long-term (more than 10 min) consultations lead to cessation levels of 13.4% (2.5% higher than the control group—no consultations), 16% (5% higher than the control group), and 22.1% (11% higher than the control group) within a 6-month period, respectively.^[5,16]

Both single- and multivariable analyses of this study indicated that lower levels of tobacco dependence were associated with greater levels of cessation success. These findings meld well with the results of Aminian *et al.*, which reported that successful and unsuccessful groups differed significantly in terms of initial levels of nicotine dependence.^[10] Furthermore, in our study, about half of the patients (50.6%) had quit smoking sometime in the past, whereas 49.4% had no history of cessation. Cessation history, however, did not produce meaningful differences in cessation levels. These findings differ from those reported by Vafai *et al.* in Ilam, Iran.^[17] That reported the cessation history significantly affected the chances of future tobacco usage. Differences between this study and Vafai's may be related to the fact that only inpatients were participated our cessation program.^[14,17]

Limitations

This study had limitations, including only inpatients, limited number of participants, older primarily male population, a lack of cooperation by some wards and failure of some participants to attend follow-up clinic sessions, requiring the use of monthly phone consultation calls. Other potentially affecting factors, such as health status, type and length of hospitalization and social and/or religious influences.

Implications of the study

We believe that hospitals should start working on smoking cessation programs as soon as the patient is admitted in the hospital.

A well-established program with the support of community medicine specialist could be very helpful to run this program in hospitals.

Conclusions

Acceptance of tobacco cessation interventions may take time and require significant financial support and trained personnel. One possible way to make rapid advances is to conduct programs among hospital inpatients. The results of this study support the viability of such efforts.

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Conflicts of interest

There are no conflicts of interest.

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